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| 09/076,317 | 05/11/98 | BIRKESTRAND | 0 102047-0003 |

JOHN F MCKENNA
CESARI AND MCKENNA
30 ROWES WHARF
BOSTON MA 02110

MM12/0608

EXAMINER

LE.D

ART UNIT PAPER NUMBER

2834

DATE MAILED: 06/08/99

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
09/076,317

Applicant(s)
Birkestrand

Examiner
Dang Dinh Le

Group Art Unit
2834



☐ Responsive to communication(s) filed on _____

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-36 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 1-14, 17-19, and 22-27 is/are rejected.

☒ Claim(s) 15, 16, 20, 21, and 28-36 is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2,3

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Drawings

1. New formal drawings are required in this application because the drawings are objected to by the Draftsperson as indicated in FORM PTO 948. However, formal correction of the noted defect can be deferred until the application is allowed by the examiner.

Claim Objections

2. Claim 1 is objected to because of the following informalities:
 - a. Claim 1, line 16, replace "shaft" with --shafts--. Appropriate correction is required.
3. Claims 15-16, 20-21, and 28-36 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims (15, 20, and 28) cannot depend on themselves. Accordingly, the claims have not been further treated on the merits.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to

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make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-14, 17-19, and 22-26 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 claims a ring gear formed in the housing interior surface which is formed by the walls of the housing as recited in lines 2 and 3 of the claim. However, the specification shows a ring gear formed by the interior surface of the hub. Claims 2-14, 17-19, and 22-26 are dependent claims of claim 1.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1, 2, 4, 6-8, 13, 14, 17, 19, 24, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800)

Regarding claim 1, Li shows a motorized wheel hub assembly having an axis and comprising:

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a housing having first (20) and second (30) end walls and a side wall extending between the end walls, the walls forming a housing interior surface;

a stator winding (10) in the housing;

a rotor (50) rotatably mounted to the housing end walls so that the rotor can rotate about the axis within the winding;

a first shaft (40) extending from the first wall along the axis;

a second shaft (90) extending from the rotor along the axis away from the first shaft and through the second wall;

a pinion (110) at the end of the second shaft outside the housing;

a plurality of planet gears rotatably mounted to the second end wall outside the housing, the planet gears being in meshing engagement with the pinion;

a third shaft (150);

means (151) for connecting the third shaft to the second end wall so that the third shaft extends along the axis away from the first and second shafts such that all the shafts are collinear but separate from one another;

a hub (190) enclosing the housing and the planet gears, the hub having first and second end walls (190, 180) rotatably receiving the first and third shafts respectively and a side wall extending between the first and second end walls, the hub side wall being spaced from the housing side wall by a relatively narrow gap;

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a ring gear formed in the housing exterior surface opposite the planet gears, the ring gear being in meshing engagement with the planet gears so that when an electric current is applied to the stator winding, the rotor rotates relative to the first and third shafts at a selected speed and the hub rotates relative to the first and third shafts at a lesser speed.

Li does not show the ring gear formed in the housing interior surface opposite the planet gears.

Kawamoto et al teach to form the ring gear (22) in the housing interior surface of the casing (1) opposite the planet gears (20) for the purpose of reducing the length of the casing.

Since Li and Kawamoto et al are all from the same field of endeavor, the purpose disclosed by Kawamoto et al. would have been recognized in the pertinent art of Li.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the ring gear in the housing interior surface opposite the planet gears as taught by Kawamoto et al. for the purpose of reducing the length of the casing.

Regarding claim 2, it is noted that Li also shows means (nuts and bolts) for sealing the interior of the housing from the interior of the hub.

Regarding claim 4, it is noted that Li also shows the third shaft (150) projecting through the hub second end wall.

Regarding claim 6, it is noted that Li also shows the rotor, housing side wall and hub wall being cylindrical.

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Regarding claim 7, it is noted that Li also shows the stator winding being a toroidal, 3 wire, 3 phase WYE-connected winding.

Regarding claim 8, it is noted that Li also shows the rotor (50) having a plurality of poles (53).

Regarding claim 13, it is noted that Li also shows (See Figure 6):

a tire rim surrounding the hub side wall;
a plurality of spokes having corresponding first and second ends;
means for connecting the first ends of the spokes to the hub, and
means for connecting the second ends of the spokes to the rim so that the rim is centered on the axis.

Regarding claims 14 and 17, it is noted that Kawamoto et al also show a tire rim (14) surrounding the hub side wall and means (15) for connecting the tire rim to the hub side wall and a tire (13) engaged around the hub side wall.

Regarding claim 19, it is noted that Kawamoto et al also show the hub second end wall (4) having a cylindrical skirt which forms an extension of the hub side wall and the ring gear (22) being formed in the skirt.

Regarding claim 24, it is noted that Li also shows the housing second end wall (30) being separable from the housing side wall and the hub first end wall (190) being separable from the hub side wall.

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Regarding claim 26, it is noted that Li also shows first means (flange of shaft 90) acting between the rotor and the housing first end wall for biasing the rotor toward the third shaft and second means (ring gear 100) acting between the means for connecting (151) and the hub second end wall for biasing the housing toward the first shaft.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 2 above, and further in view of Frister.

Regarding claim 3, the assembly of Li modified by Kawamoto et al includes all that is recited in the claimed invention except for means for introducing a thermally conductive liquid into the hub so that when the hub rotates relative to the first and third shafts, the liquid is circulated through the gap so that heat generated within the housing is conducted by the liquid to the hub walls and thence to the outside.

Frister teaches to include means (11a) for introducing a thermally conductive liquid into the electric generator, the liquid being circulated through the gap so that heat generated within the housing (12) is conducted by the liquid to the outside for the purpose of cooling the generator assembly.

Since Li, Kawamoto et al, and Frister are all from the same field of endeavor, the purpose disclosed by Frister would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include means for introducing a thermally conductive liquid into the hub

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so that when the hub rotates relative to the first and third shafts, the liquid is circulated through the gap so that heat generated within the housing is conducted by the liquid to the hub walls and thence to the outside as taught by Frister for the purpose of cooling the generator.

9. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Yang et al.

Regarding claim 5, the assembly of Li modified by Kawamoto et al includes all that is recited in the claimed invention except for the hub second end wall covering the third shaft so that the assembly can be cantilever-mounted via the first shaft.

Yang et al teach to cover the third shaft (42) with the hub end wall (8) so that the assembly can be cantilever-mounted via the first shaft (1) for the purpose of mounting the assembly by a single end.

Since Li, Kawamoto et al, and Yang et al. are all from the same field of endeavor, the purpose disclosed by Yang would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to cover the third shaft with the hub second end wall so that the assembly can be cantilever-mounted via the first shaft as taught by Yang et al. for the purpose of mounting the assembly by a single end.

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10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Takamiya et al.

Regarding claim 9, the assembly of Li modified by Kawamoto et al includes all that is recited in the claimed invention including the means for connecting including a retainer plate (150) releasably mounted to the axles (151), the third shaft (protrusion of 150) extending axially from the retainer plate.

Li does not show the axles projecting from the housing second end wall.

Takamiya et al teach to project the axles (25) from the housing end wall (5) for the purpose of retaining the axles in place.

Since Li, Kawamoto et al, and Takamiya et al. are all from the same field of endeavor, the purpose disclosed by Takamiya et al. would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to project the axles from the housing second end wall as taught by Takamiya et al. for the purpose of retaining the axles in place.

Regarding claim 10, it is noted that Li also shows the third shaft (a protrusion end of 150) projecting through the hub second end wall.

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11. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) and Takamiya et al. as applied to claim 9 above, and further in view of Yang et al.

Regarding claim 11, the assembly of Li modified by Kawamoto et al. and Takamiya et al. includes all that is recited in the claimed invention except for the hub second end wall covering the third shaft so that the assembly can be cantilever-mounted via the first shaft.

Yang et al teach to cover the third shaft (42) with the hub end wall (8) so that the assembly can be cantilever-mounted via the first shaft (1) for the purpose of mounting the assembly by a single end.

Since Li, Kawamoto et al, Takamiya et al., and Yang et al. are all from the same field of endeavor, the purpose disclosed by Yang et al. would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to cover the third shaft with the hub second end wall so that the assembly can be cantilever-mounted via the first shaft as taught by Yang et al. for the purpose of mounting the assembly by a single end.

12. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Hirose et al. (US Patent No. 5,341,892) and Yang et al.

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Regarding claim 12, the assembly of Li modified by Kawamoto et al. includes all that is recited in the claimed invention except for a sprocket and a one-way clutch connected between the sprocket and the hub second end wall so that the sprocket can rotate about the axis in only one direction relative to the hub.

Hirose et al teach to include a sprocket (120) and Yang et al teach to use the clutch (7) for the purpose of transmitting rotation.

Since Li, Kawamoto et al, Hirose et al., and Yang et al. are all from the same field of endeavor, the purpose disclosed by Hirose and Yang et al. would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to include a sprocket and to use the clutch as taught by Hirose and Yang et al for the purpose of transmitting rotation.

13. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Rockland.

Regarding claim 18, the assembly of Li modified by Kawamoto et al. includes all that is recited in the claimed invention except for a ring gear being formed in the hub side wall.

Rockland teaches to form the ring gear in the hub side wall for the purpose of reducing parts. See Rockland Servo Wheel Design Features, page 4, Integrated Output Stage section.

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Since Li, Kawamoto et al, and Rockland are all from the same field of endeavor, the purpose disclosed by Rockland would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the ring gear in the hub side wall as taught by Rockland for the purpose of reducing parts.

14. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Toida et al.

Regarding claim 22, the assembly of Li modified by Kawamoto et al. includes all that is recited in the claimed invention except for each planet gear having a relatively large diameter first section in meshing engagement with the pinion and a smaller diameter second section collinear to the first section and in meshing engagement with the ring gear so that the assembly has two-stage gear reduction.

Toida et al teach to form planet gears with a relatively large diameter first section (5b) in meshing engagement with the pinion (5a) and a smaller diameter second section (5c) collinear to the first section and in meshing engagement with the ring gear (5d) for the purpose of making a two-stage gear reduction.

Since Li, Kawamoto et al, and Toida are all from the same field of endeavor, the purpose disclosed by Toida would have been recognized in the pertinent art of the others.

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It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form each planet gear with a relatively large diameter first section in meshing engagement with the pinion and a smaller diameter second section collinear to the first section and in meshing engagement with the ring gear as taught by Toida et al. for the purpose of making a two-stage gear reduction.

15. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Takamiya et al. and Cowan.

Regarding claim 23, the assembly of Li modified by Kawamoto et al. includes all that is recited in the claimed invention except for the hub being less than 5 inches in diameter and the assembly having a gear reduction ratio exceeding 10:1.

Takamiya et al teach to make the hub smaller than 5 inches in diameter for the purpose of reducing weight. Note that the ring 11 is 64 mm in diameter as shown in column 10, line 40. In addition, Cowan teaches to make a gear reduction at different ratios for the purpose of increasing torque.

Since Li, Kawamoto et al, Takamiya et al., and Cowan are all from the same field of endeavor, the purpose disclosed by Takamiya et al. and Cowan would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to make the hub smaller than 5 inches in diameter and to make a gear

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reduction ratio exceeding 10:1 as taught by Takamiya and Cowan for the purpose of reducing weight and increasing torque.

16. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Kawamoto et al. (US Patent No. 5,014,800) as applied to claim 1 above, and further in view of Biesack et al.

Regarding claim 25, the assembly of Li modified by Kawamoto et al. includes all of the limitations of the claimed invention including electrical leads (42) extending from the connector along the first shaft to the interior of the housing and means for connecting the leads to the stator winding.

Li does not show an electrical connector mounted to the first shaft.

Biesack et al teach to mount a connector (29) to the end housing for the purpose of simplifying connection.

Since Li, Kawamoto et al., and Biesack et al. are all from the same field of endeavor, the purpose disclosed by Biesack et al. would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to mount a connector to the first shaft as taught by Biesack et al. for the purpose of simplifying connection.

17. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li (US Patent No. 5,581,136) in view of Rockland.

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Regarding claim 27, this claim is similar to claim 1 except that the ring gear is formed at the interior surface of the hub. Li shows all of the limitations in claim 1 except for the ring gear being formed at the interior surface of the hub. Li forms his ring gear at the exterior surface of the motor housing.

Rockland teaches to form the ring gear in the hub side wall for the purpose of reducing parts. See Rockland Servo Wheel Design Features, page 4, Integrated Output Stage section.

Since Li and Rockland are both from the same field of endeavor, the purpose disclosed by Rockland would have been recognized in the pertinent art of the others.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to form the ring gear in the hub side wall as taught by Rockland for the purpose of reducing parts.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See FORM PTO 892.

Information on How to Contact USPTO

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dang Dinh Le whose telephone number is (703) 305-0156.

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Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-1782. The fax number for this group is (703) 305-3431 and 305-3432.



NESTOR RAMIREZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Dang Dinh Le

June 5, 1999